12-1-2009

Evaluating the Reliability and Validity of the Muscle Dysmorphia Inventory

Rebecca Sue Cubberley
Western Kentucky University, rebecca.cubberley@wku.edu

EVALUATING THE RELIABILITY AND VALIDITY OF THE MUSCLE DYSMORPHIA INVENTORY

A Thesis
Presented to
The Faculty of the Department of Psychology
Western Kentucky University
Bowling Green, Kentucky

In Partial Fulfillment
Of the Requirements for the Degree
Master of Arts

By
Rebecca Sue Cubberley

December 2009

EVALUATING THE RELIABILITY AND VALIDITY OF THE MUSCLE DYSMORPHIA INVENTORY

Date Recommended: May 20, 2009

Director of Thesis: Frederick Grieve

Elisabeth Jones

Pitt Derryberry

Dean, Graduate Studies and Research Date

TABLE OF CONTENTS

EVALUATING THE RELIABILITY AND VALIDITY OF THE MUSCLE DYSMORPHIA INVENTORY

Name: Rebecca Cubberley Date: December 2009 Pages: 47

Directed by: Frederick Grieve, Pitt Derryberry, Elisabeth Jones

Department of Psychology Western Kentucky University

Throughout the years, women have been the focus of eating disorders and body image research. With women being the focus of research in these areas, disorders such as Anorexia Nervosa, Bulimia Nervosa, and Body Dysmorphic Disorder (BDD) have caught the eyes of researchers. With this new discovery, there has been a recent surge of research on body image issues and men. Originally termed *reverse anorexia* or *bigorexia*, Muscle Dysmorphia (MD) has gained the attention of researchers for about a decade (Grieve, 2007; Pope, Katz & Hudson, 1993; Pope, Gruber, Choi, Olivardia & Phillips, 1997).

The Muscle Dysmorphia Inventory (MDI) was created to measure the symptoms of MD and provide clinicians with an inventory that would aid them in the diagnosis and treatment of MD (Short, 2005). The MDI is a 34-item scale that uses the etiological model proposed by Grieve (2007) and assesses or evaluates the four proposed diagnostic criteria of MD (Short, 2005). Short (2005) developed questions using the four criteria of MD outlined by Olivardia (2001).

While the MDI has shown good internal consistency (Cronbach's alpha = .87; Short, 2005), no other psychometric properties have been assessed. The goal of this study was to assess the validity and reliability of the MDI so that the accuracy of the measure

will be known and it may be used as a diagnostic tool in clinical settings. The hypothesis of the study was that the MDI is a reliable and valid measure.

This study assessed the reliability and validity of the MDI through a correlational design. Test-retest reliability and Cronbach's alpha were used to identify the reliability of the MDI. The MDI was compared to tests that measure traits of MD and to self-reported behaviors, which assessed concurrent and predictive validity of the MDI.

The MDI appears to be a good diagnostic tool for clinicians to use when looking at MD. This study examined the reliability and the validity of the MDI. This study shows that the MDI has adequate test-retest reliability, and good internal consistency. The results indicate that the MDI has good concurrent validity when compared to other tests that measure symptoms of MD. Under predictive validity, there was some support to suggest that the MDI can predict MD, however, the predictive validity of the MDI needs to be examined more in-depth. The MDI appears to measure more state symptoms of MD than trait symptoms. This may make it easier for clinicians to detect an emerging problem before it becomes harder for the individual to overcome.

Introduction

Throughout the years, women have been the focus of eating disorders and body image research. With women being the focus of research in these areas, disorders such as Anorexia Nervosa, Bulimia Nervosa, and Body Dysmorphic Disorder (BDD) have caught the eyes of researchers. Originally, men were not thought to have issues with body image. However, the neglect of research regarding men has come to an end with the discovery of body image issues that affect men. With this new discovery, there has been a recent surge of research on male body image issues. Originally termed *reverse anorexia* or *bigorexia*, Muscle Dysmorphia (MD) has gained the attention of researchers for about a decade (Grieve, 2007; Pope, Katz & Hudson, 1993; Pope, Gruber, Choi, Olivardia & Phillips, 1997).

Muscle Dysmorphia (MD)

Pope and his colleagues (Pope et al., 1997) outlined the diagnostic features of MD. Individuals with MD have a persistent concern that they are inadequately muscular, with the concern causing distress and impairment. The individuals may or may not have insight into their condition and tend to avoid situations where their bodies may be seen. If the situation is unavoidable, individuals with MD feel distress while enduring it. Some individuals with MD experience problems in relationships with others due to humiliation about their bodies. Another diagnostic feature of MD is the emphasis individuals place on diet and their workout schedule. The individuals with MD also place less importance on intimate relationships and their occupations. Individuals with MD report that they become anxious if they deviate from their workout schedule or low fat, high-protein diet.

Another diagnostic feature of MD is the avoidance of eating with others (Pope et al., 1997).

Olivardia (2001) expanded on the symptoms of MD and outlined three criteria for MD, with the first criterion being that the individuals are preoccupied with the idea that their bodies are not lean or muscular enough. The second criterion for MD is that the individuals' preoccupation causes clinically significant impairment or distress in occupational, social, or other important areas of functioning. Olivardia (2001) also stated that individuals must meet two of the following four criteria to be diagnosed with MD. The first sub-criterion is that the person frequently misses important occupational, social, or recreational activities to fulfill the compulsive need to keep up his or her diet and workout schedule. The second sub-criterion is that the person stays away from situations where his or her body is exposed to others, or goes through such situations with high distress or intense anxiety. The third sub-criterion is that there is a preoccupation with the inadequacy of the person's body size or musculature that causes clinically significant impairment or distress in occupational, social, or other areas of functioning. The last sub-criterion is that the person still diets, works out, or uses performance-enhancing substances even though he or she has knowledge about the adverse psychological or physical consequences. The last criterion that Olivardia addresses is that the person's primary focus is on preoccupation and behavior with musculature, not on being fat like anorexia nervosa, or on single aspects of appearance, like other forms of BDD.

BDD Features of MD

BDD occurs when an individual has an extreme preoccupation with a perceived or slight body defect (American Psychiatric Association, 2000). In BDD, there can be a preoccupation with a particular body part, such as the nose; however, MD is a preoccupation with the whole body and how muscular the individual feels she or he is or needs to be (Pope et al., 1997). Pope et al. (1993) describe a research participant who felt that he needed to hide his smallness with heavy sweatshirts during summer even though he weighed 180 pounds with a height of 72 inches. Individuals with MD feel that they are not large or muscular enough and their lives become preoccupied with activities such as dieting or weightlifting (Pope et al., 1997). MD is not better accounted for by BDD because MD is a discontent with body shape in general and not a specific part of the body like BDD.

Obsessive Compulsive Disorder Features of Muscle Dysmorphia

Muscle dysmorphia also has features of Obsessive-Compulsive Disorder (OCD; Chandler, 2007; Maida & Armstrong, 2005). Maida and Armstrong found that MD had correlations with measures of OCD. The researchers also found that individuals with MD had an obsession with being too small. Individuals in the study also reported compulsions like mirror checking, and the compulsive need to work out a certain number of times during a day or week or at a certain time in the day. Chandler also found that MD had correlations with obsessive-compulsive features and trait anxiety. In this study, obsessive-compulsive features and trait anxiety were predictive of muscle dysmorphia symptomatology.

Eating Disorder features of Muscle Dysmorphia

MD has similar characteristics to eating disorders (Pope et al., 1993). The symptoms of MD that resemble symptoms of eating disorders include binge eating episodes, strict dietary regimens, a need for the individual to hide his or her body with large clothing, and strict exercise practices (Grieve, 2007). The etiology for MD and eating disorders is similar. Jonda (2007) examined variables that cause both disorders and found that body dissatisfaction, media influences, and negative mood state all influence both MD and eating disorders.

Conceptual Model for Muscle Dysmorphia

Grieve (2007) developed a conceptual model for MD that described the factors that contribute to the development of MD. In the model, Grieve proposed that there are four different types of variables that contribute to the development of MD, including socioenvironmental factors, emotional factors, psychological factors, and physiological factors (Grieve, 2007). Grieve further connected nine variables to the conceptual model. These include sport participation, media influences, negative affect, body dissatisfaction, self-esteem, ideal body internalization, body distortion, perfectionism, and body mass.

A problem faced by individuals with symptoms of MD is body dissatisfaction. In a study by Connor-Greene (1988), 47% of men wanted to gain weight, meaning that they were not satisfied with their appearance. These men felt as though they were too small and that they did not have enough muscle mass. Men are dissatisfied with the muscularity of their bodies, rather than focusing on thinness and weight, as women do (Brownell & Rodin, 1994; Lantz, Rhea, & Mayhew, 2001). Furnham & Calnan (1998) found that adolescent boys who were dissatisfied with their bodies wanted to either lose

or gain weight, with the ultimate goal being to achieve a more muscular body. Finally, underweight college-age men exhibit severe negative self-image that is either more negative or equal to that of overweight females (Harmatz, Gronendyke, & Thomas, 1985).

The term body distortion involves an inaccurate perception in how individuals view their bodies. Individuals with MD perceive their bodies as smaller than they actually appear, and not of sufficient muscularity (Olivardia, 2001). This is very similar to individuals who suffer from Anorexia Nervosa (AN). Individuals with AN perceive their bodies as larger than they actually appear (American Psychiatric Association, 2000). Pope, Gruber, et al. (2001) found that bodybuilders with MD saw themselves as small when, in fact, they were muscular. Individuals with MD see others with similar body dimensions as muscular, but fail to see themselves as equally muscular (Olivardia, 2001).

Increased muscularity and leanness are together a risk factor for MD. Individuals with a muscular mesomorphic body type or even a hypermesomorphic body type, which is an overly muscular body, are more likely to experience MD (Grieve, 2007). Individuals with MD tend to avoid, or not emphasize, aerobic exercise for fear that they may lose muscle mass (Pope et al., 1997). Raudenbush & Meyer (2003) found that male athletes want to gain muscle mass to reach their ideal body and the body that the athletes felt was more attractive to the opposite sex.

The media has increased its emphasis on a lean muscular figure for males (Pope, Olivardia, Borowiecki, & Cohane, 2001). Male models in magazine advertisements and action figures have undergone a transformation over the past 20 years (Liet, Pope, & Gray, 2001; Pope, Olivardia, Gruber, & Borowiecki, 1999). Normal male bodies were

depicted in the *Playgirl* magazine 25 years ago, but have progressed into figures that are unattainable to the average person in recent years (Liet et al., 2001). There has also been an increase in the number of advertisements depicting undressed men throughout the years (Pope et al., 1999). Male action toys have also seen a similar trend, with an increase in musculature in the past 30 years. More recent action figures have a muscle mass over and above that of bodybuilders, making this body image unattainable to the average person (Pope et al., 1999). Vartanian, Giant, & Passino (2001) found that men's body satisfaction was influenced by the mass media. Lorenzen, Grieve, & Thomas (2004) found that men's exposure to male models that were muscular decreased the men's body satisfaction. Similar findings by Baird & Grieve (2006) found that men who viewed male models in advertisements exhibited a decrease in body satisfaction.

In recent studies, men have overestimated the body size that women find attractive (Grieve, Newton, Kelly, Miller, & Kerr, 2005). Individuals with MD have been found to accept what their culture portrays as the ideal body, which is the hypermesomorphic body or a body that is overly muscular. This ideal body internalization affects their body satisfaction (Grieve, 2007). Pope, Gruber et al. (2001) found that men want a body that is 27 pounds more muscular than their current body, which the researchers feel explains the increase in muscle dysmorphia.

It is believed that sports participation impacts the likelihood of exhibiting symptoms of MD. Individuals who participate in sports that place an emphasis on a large muscle mass are more likely to feel pressure to conform to a certain body shape, which can increase the risk of developing symptoms of MD (Grieve, 2007). Football and bodybuilding are examples of sports that place an emphasis on a large muscle mass. Pope

and Katz (1994) estimated that 10% of bodybuilders have MD. Raudenbush & Meyer (2003) found that athletes in their study who used muscle-building supplements were on average 15 pounds heavier and spent more hours in a week in workouts than those who did not use supplements, and MD was the most prevalent body-image disturbance among athletes.

Individuals with MD exhibit a low self-esteem. When an individual places his or her appearance as important, but yet can not reach his or her ideal, his or her self-esteem suffers (Grieve, 2007). Studies have found a relationship between self-esteem and body dissatisfaction (Cohane & Pope, 2001; Grieve & Hemlick, 2007). Olivardia (2001) found that some individuals with MD report that their self-esteem is determined by how muscular they are. If individuals with MD feel that they are too small, then they have low self-esteem because they do not feel muscular enough.

Individuals with MD have an unrealistic goal of reaching a hypermesomorphic body type (Grieve, 2007). Grieve (2007) believes that perfectionism influences MD by the individual's pursuit for the "perfect body." Grieve (2007) also feels that negative affect also plays into the conceptual model of MD by influencing body distortion, body dissatisfaction, and low self-esteem.

Assessment Measures

With an expanding knowledge of information on the symptomatology of MD there is a need for an accurate assessment to measure MD in individuals. Cafri and Thompson (2004b) established three guidelines for assessing male body image and looked at the existing methods of assessment. The first guideline is that the male body image measure should evaluate a muscular appearance. Secondly, the measure should

have items that are indirectly linked with the body's appearance that are related to muscularity. Lastly, if the measure asks about specific body parts, the upper torso should be included in the measure.

Within assessment of male body image, there are two types of assessment measures, perceptual assessments and subjective assessments. Within perceptual assessments, a measurement of the individual's size accuracy and measurement with weight categories are the assessments generally used in male body image. The measurement of size accuracy assesses the individual's ability to accurately estimate his or her size. The weight categories assessment measures how well an individual can place his or her body into a weight category. In perceptual measures, an individual is limited to just how the individual views his or her body, whereas subjective measures can explore more aspects of how an individual feels and thinks about his or her body. Subjective assessments in male body image can assess a range of issues, which have focused on the individual's satisfaction with appearance, concern and anxiety over appearance, and attitudinal judgments (Cafri & Thompson, 2004a). Within subjective measures, there are two ways of measuring responses, which are Likert-type scales and contour drawn silhouette scales. An example of a Likert-type scale for male body image is the Drive for Muscularity Scale (DMS; McCreary & Sasse, 2000, Cafri & Thompson, 2004a). Research by Cafri & Thompson (2004a) suggests the Drive for Muscularity Scale has high concurrent validity with behaviors to increase muscularity. Another example of a Likert-type scale is the Muscle Appearance Satisfaction Scale (MASS; Mayville, Williamson, White, Netemeyer, & Drab, 1994). The MASS was created to assess muscle dysmorphia symptoms and demonstrates good test-retest reliability, internal consistency,

and construct validity (Olivardia, 2001). There are good assessments out there for measuring a specific aspect of MD; however, there are few that measure all aspects of MD.

Muscle Dysmorphia Inventory

The Muscle Dysmorphia Inventory (MDI) was created to measure the symptoms of MD and provide clinicians with an inventory that would aid them in the diagnosis and treatment of MD (Short, 2006). The MDI is a 34-item scale that uses the etiological model proposed by Grieve (2007) and assesses or evaluates the four proposed diagnostic criteria of MD (Short, 2006). Short (2006) developed questions using the four criteria of MD outlined by Olivardia (2001).

The MDI has ten components within the inventory that include Body Anxiety, Compulsivity, Illusory Eating, Inadequacy, Inappropriate Eating, Increased Muscularity, Muscularity Drive, Persistence, Preoccupation, and Social Sacrifice (Short, 2006). Of the ten components, the Inadequacy component ties in with the psychological variable of MD dealing with self-esteem. The Preoccupation and Body Anxiety components relate to the emotional variable of MD pertaining to body dissatisfaction. The components Persistence, Increased Muscularity, Compulsivity, and Social Sacrifice relate to the cognitive variable of MD pertaining to the drive for perfectionism. The component Muscularity Drive relates to the socioenvironmental variable of MD through media and sports (Short, 2006). The component of Preoccupation is a measure of Olivardia's (2001) first diagnostic criterion. The components Inadequacy, Body Anxiety, Social Sacrifice, and Persistence are a measure of Olivardia's second diagnostic criterion (Short, 2006).

During creation of the MDI, the component Inadequacy accounted for the most variance, Preoccupation accounted for the second most, Compulsivity the third most, muscularity Drive the fourth most, Increased Muscularity the fifth most, Body Anxiety the sixth most, Social Sacrifice the seventh most, and Persistence the eighth amount of variance (Short, 2006).

While the MDI has shown good internal consistency (Cronbach's alpha = .87; Short, 2006), no other psychometric properties have been assessed. The goal of this study was to assess the validity and reliability of the MDI so that the accuracy of the measure will be known and it may be used as a diagnostic tool in clinical settings. The hypothesis of the study was that the MDI is a reliable and valid measure. Specific subtests within the MDI also have not been compared to other measures of MD and should also be highly correlated with other measures that assess MD. An additional hypothesis is that the subtests Body Anxiety and Preoccupation will have a high correlation with the Body Assessment Scale (BAS).The third hypothesis is that the subtests Social Sacrifice, Increased Muscularity, Body Anxiety, Compulsivity, Persistence and Preoccupation will have a high correlation with Muscle Appearance Satisfaction Scale (MASS). The fourth hypothesis is that the subtests Illusory Correlation, Increased Muscularity, Body Anxiety, Inappropriate Eating, Preoccupation, and Inadequacy will have a high correlation with Male Body Attitudes Scale (MBAS). The fifth hypothesis is that the subtests Social Sacrifice, Muscularity Drive, and Body Anxiety will have a high correlation with the number of hours a person participates in weightlifting.

Methods

Participants

Participants were 78 men recruited from Western Kentucky University. The population tested was a non-clinical sample. All participants were over the age of 18. The mean age of the participants was 25.16 years (SD = 9.29). There were 64 Caucasian (81%), 12 African American (15%), one Hispanic (1%), one Asian (1%) participants. In addition, one participant (1%) identified his ethnicity as other. Thirty-two participants reported that they lifted weights.

Design

This study assessed the reliability and validity of the MDI through a correlational design. Test-retest reliability and Cronbach's alpha were used to identify the reliability of the MDI. The MDI was compared to tests that measure traits of MD and to self-reported behaviors, which assessed concurrent and predictive validity of the MDI. Regression analysis was preformed on the data to compare specific subscales on the MDI to specific questionnaires.

Measures

Demographics. Participants completed a three-item questionnaire assessing age, education level, and ethnicity (See Appendix A).

Muscle Dysmorphia Inventory (MDI). The MDI is a 34-item questionnaire assessing symptoms of MD (Short, 2005). Items are presented on a six-point Likert-type scale, ranging from 1 (*Strongly Disagree*) to 6 (*Strongly Agree*). Items are summed to create a total score, with higher scores indicating more symptoms of MD. Individuals respond to items such as "I am more muscular than others," and "I have difficulty

maintaining relationships because of thoughts of working out." The internal consistency of the MDI was calculated using Cronbach's alpha, and was found to be .87, which indicates a high level of internal consistency (Short, 2006). See Appendix B for the MDI.

Body Assessment (BAS) Scale. The BAS (Lorenzen et al., 2004) is a 25-item scale that assesses the level of satisfaction that individuals have with different parts of their bodies. Items are presented on a five-point Likert-type scale that ranges from 1 (*Strongly Positive*) to 5 (*Strongly Negative*). Individuals rate how they feel about areas such as "Body Shape" and "Health." Items are summed to crate a total score, with higher scores indicating a lower global body satisfaction overall. The internal consistency of the BA has been shown to be good with a Cronbach's alpha of .94 (Lorenzen et al., 2004). See Appendix C.

Muscle Appearance Satisfaction Scale (*MASS).* The MASS (Mayville, Williamson, White, Netemeyer, & Drab, 1994) is a 19-item self report measure that assesses for symptoms of muscle dysmorphia. The MASS has a five-factor structure that includes body building dependence, muscle checking, injury, muscle satisfaction, and substance use. Items are presented on a seven-point Likert-type scale, from 1=Strongly Disagree to 5=Strongly Agree. Items are summed to create a total score, with higher scores indicating more symptoms of muscle dysmorphia. Individuals respond to items such as, "When I look at my muscles in the mirror, I often feel satisfied with my current muscle size," and, "My self-worth is very focused on how my muscles look." The MASS and its subscales have acceptable internal consistency, with alpha coefficients greater than .70. The test-retest reliability of the MASS has been shown to be good with a Cronbach's alpha of .87 (Mayville et al., 1994). See Appendix D.

Male Body Attitudes Scale (MBAS). The MBAS (Tylka, Bergeron, & Schwartz, 2005) is a 29-item scale that measures the following areas: drive for muscularity, body esteem, pressures for muscularity, internalization of the muscular ideal, pressures for thinness, self-esteem, eating disorder symptomatology, impression management, and body comparison. Items are presented on a six-point Likert-type scale that ranges from 1 (*Always*) to 6 (*Never*). Items are summed to create a total score, with lower scores indicating more muscle dysmorphia symptoms. Individuals respond to items such as, "I think that my body should be leaner," and, "I am concerned that my stomach is too flabby." The MBAS has excellent internal consistency with a Cronbach's alpha of .91 (Tylka et al., 2005). See Appendix E.

Body Questionnaire (BQ). The BQ is a 26-item self report measure that looks at exercise and health history. The BQ was created for this study, and items were taken out of the demographics questionnaire from the study by Short (2005). The items assess behaviors that are associated with symptoms of MD. Examples of questions include, "How many times a day do you lift weights," and, "Do you ever have to use pain medication before you exercise." See Appendix F.

Procedure

Before participating in the study, all participants completed an informed consent document. See Appendix G. Each participant then completed a brief demographics questionnaire, the MDI, BAS, and MBAS. The order of the administration of the five tests was determined using a Latin Square. The participant then returned two weeks later to complete the MDI and the Body Questionnaire. Each session took approximately 20 minutes to complete.

Results

A correlation design was used to assess the test-retest reliability, concurrent validity, and predictive validity of the MDI. The sum total score of each test was the score used in the analysis of the study. To determine the test-retest reliability of the MDI, the sum of the MDI at Time 1 was correlated with the sum of the MDI at Time 2. The sum totals of the MDI subtest were also correlated comparing Time 1 to Time 2. For concurrent validity, the sum of the MDI at Time 1 and Time 2 was averaged, and the MDI average was correlated with the sums of the BA, MASS, and MBAS. Pearson's correlation analysis was used to assess the concurrent validity of the MDI compared to other measures. From the correlational analysis, a validity coefficient was obtained. The predictive validity was determined by comparing the score of the MDI with the BQ by correlating the total score on the MDI with behaviors reported on the BQ. Regression analysis was preformed on the data to compare specific subscales of the MDI to certain questionnaires.

Cronbach's Alpha was calculated on the MDI at Time 1, MDI at Time 2, BAS, MASS, and MBAS to determine the reliability of each scale's questions. Cronbach's alpha for the MDI at Time 1 was .85, which shows a high level of reliability. Cronbach's Alpha for the MDI at Time 2 is .90, which also shows a high level of reliability. The Cronbach's Alpha for the Body Anxiety subscale at Time 1 was .36, and was .65 at Time 2, which shows a low level of reliability. Cronbach's Alpha for the Compulsivity subscale at Time 1 was .74 and .85 at Time 2 shows a moderate level of reliability. The Illusory Correlations subscale had a Cronbach's Alpha of .38 at Time 1 and .91 at Time 2, which indicates a high level of reliability at Time 2. Cronbach's Alpha for the

Inadequacy subscale at Time 1 was .84 and at Time 2 was .80, which shows high level of reliability. The Inappropriate Eating subscale had a Cronbach's Alpha of .63 at Time 1 and .74 at Time 2 indicating a moderate level of reliability. Cronbach's Alpha for Increased Muscularity at Time 1 was .74 indicating a moderate level of reliability. Cronbach's Alpha for Muscularity Drive at Time 1 was .72 and .51 at Time 2, which shows a moderate level of reliability. The Persistence subscale had a Cronbach's Alpha of .73 at Time 1 and .88 at Time 2, which shows a moderate level of reliability. The Preoccupation subscale had a Cronbach's Alpha at Time 1 of .60 and .81 at Time 2 indicating a moderate level of reliability. Cronbach's Alpha for Social Sacrifice at Time 1 was .37 and at Time 2 was .36, indicating a low level of reliability. The MBAS had a Cronbach's Alpha of .90, and the Cronbach's Alpha for the BAS was .91. All measures show a high level of internal consistency, however not all of the subtests in the MDI show a high level of internal consistency. Due to the number of analyses, a Bonferroni correction was used to determine statistical significance. The Alpha was set at p = .01.

Test-retest reliability and Concurrent Validity

The two-week test-retest reliability of the MDI was $r = .59$, ($p < 0.01$). The Body Anxiety subscale reliability was $r = .78$, ($p < 0.01$). The two-week test-retest reliability of the Compulsivity subscale was $r = .73$, ($p < 0.01$). The Illusory Correlation subscale reliability was $r = .59$, ($p < 0.01$). The Inadequacy subscale reliability was r = .82, ($p < 0.01$). The Inappropriate Eating subscale reliability was $r = .78$, ($p < 0.01$). The two-week test-retest reliability of the Increased Muscularity subscale was $r = .75$, ($p < 0.01$). The Muscularity Drive subscale reliability was $r = .49$, ($p < 0.01$). The Persistence subscale reliability was $r = .86$, ($p < 0.01$). The two-week test-retest reliability of the

Preoccupation subscale was $r = .62$, ($p < 0.01$). The Social Sacrifice subscale reliability was $r = .33$, ($p < 0.01$).

Next, the MDI Time 1 and Time 2 scores were averaged and compared to the MBAS, and BAS and MASS to determine the concurrent validity. The MDI was first compared with the MBAS, which revealed a significant negative correlation at $r = -.41$, ($p < 0.01$) with the MDI. The MDI was also compared with the BAS. The MDI was not significantly related to the BAS, $r = -.06$, ($p = .64$). Lastly, the MDI was compared with the MASS, which revealed a significant positive correlation at $r = .75$, ($p < 0.01$).

Next, The MDI subscales were compared to specific tests through regression analyses to determine significance. First, the BAS was compared to the MDI subscales Body Anxiety and Preoccupation, which was not found to be significant, $F(2,46) = 1.91$, $p = .15$.

Next, the MASS was compared to the MDI subscales Social Sacrifice, Increased Muscularity, Body Anxiety, Compulsivity, Persistence, and Preoccupation, which was statistically significant, $F(2,46) = 9.08$, $p = .00$.

Then, the MBAS was compared to the MDI subscales Body Anxiety, Persistence, Preoccupation, Increased Muscularity, Compulsivity, and Social Sacrifice, which was statistically significant, $F(6,46) = 9.11$, $p = .00$.

Lastly the Question 5 of the BQ that looks at the hours an individual spent weightlifting with the MDI subscales Body Anxiety, Muscularity Drive, and Social Sacrifice, which was not found to be significant, $F(3,46) = .60$, $p = .61$.

Predictive Validity

Next, the sum of the MDI was correlated with questions on the BQ to determine the predictive validity of the MDI. The first items on the BQ that were correlated with the MDI pertained to the total number of exercise hours a week spent weightlifting. There was a significant correlation of $r = .64$, ($p < 0.01$) for the MDI at Time 2; however, there was not a significant correlation with the MDI at Time 1, $r = .22$, ($p = .11$). Next, the sum of the MDI was correlated with the total number of hours spent performing cardiovascular exercise. There was not a significant correlation for the MDI at Time 1, $r = .15$ ($p = .28$), or at Time 2, $r = .21$ ($p = .11$). The sum of the MDI was correlated with the total number of hours spent exercising a week. Again, there was a significant correlation with the MDI at Time 2, with a correlation of $r = .60$, ($p < 0.01$); however, there was no significant finding for the MDI at Time 1, $r = .26$, ($p = .06$).

Lastly, the MDI was correlated with specific questions on the BQ. The first question that was correlated with the MDI was question 1 of the BQ, which asks if the participant has an active gym membership. The MDI at both Time 1 and Time 2 showed significant correlations at $r = .37$ ($p < 0.01$) at Time 1 and $r = .45$ ($p < 0.01$) at Time 2. The next question that was correlated with the MDI was question 9, which measures how many supplements the participant uses, such as steroids and protein shakes. The MDI at Time 2 showed a significant correlation at $r = .51$ ($p < 0.01$); however, at Time 1 there was not a significant correlation, $r = .09$, ($p = .50$). Question 17, which had the participant list all of the organized sports that he ever played, was also correlated with the MDI. No significant correlations were found at Time 1, $r = .29$ ($p = .03$) or at Time 2, $r = .23$ ($p = .08$). Lastly Question 18, which had the participant list all of the organized sports

that he currently plays, was correlated with the MDI and revealed no significant findings at Time 1, $r = .12$ ($p = .36$) or at Time 2, $r = .11$ ($p = .42$).

Discussion

The goal of this study was to assess the validity and reliability of the MDI so that the accuracy of the measure would be known and it may be used as a diagnostic tool in clinical settings. The hypothesis of the study was that the MDI is a reliable and valid measure. The results generally support the hypothesis that the MDI will be a good diagnostic tool to aide clinicians in the diagnosis of MD. An additional hypothesis was that the subtests Body Anxiety and Preoccupation will have a high correlation with the Body Assessment Scale (BAS). However, the results did not support this hypothesis. Further analysis should look into the questions of the subscales Body Anxiety and Preoccupation. The third hypothesis is that the subscales Social Sacrifice, Increased Muscularity, Body Anxiety, Compulsivity, Persistence, and Preoccupation will have a high correlation with Muscle Appearance Satisfaction Scale (MASS). The results of this hypothesis support that the subscales Social Sacrifice, Increased Muscularity, Body Anxiety, Compulsivity, Persistence, and Preoccupation have a high correlation to the Muscle Appearance Satisfaction Scale (MASS).The fourth hypothesis was that the subtests Illusory Correlation, Increased Muscularity, Body Anxiety, Inappropriate Eating, Preoccupation, and Inadequacy will have a high correlation with Male Body Attitudes Scale (MBAS). The results support the hypothesis that the subtests Illusory Correlation, Increased Muscularity, Body Anxiety, Inappropriate Eating, Preoccupation, and Inadequacy have a high correlation with Male Body Attitudes Scale (MBAS). The fifth hypothesis was that the subtests Social Sacrifice, Muscularity Drive, and Body Anxiety will have a high correlation with the number of hours a person participates in weightlifting. The results of the study did not support the findings that the subtests Social

Sacrifice, Muscularity Drive, and Body Anxiety had a high correlation with the number of hours a person participates in weightlifting.

Participants took the MDI twice. At Time 1 the also completed demographics and concurrent validity measures. At Time 2 participants also completed predictive validity measures.

Test-retest Reliability

The results of the study demonstrate a high level of test-retest reliability for the MDI, $r = .59$, ($p < 0.01$). When comparing the reliability of the MDI, there was a significant correlation for the test-retest reliability of the MDI, which also suggests that the MDI will get consistent responses every time that it is taken by the same individual. However, the test-retest correlation of the MDI was lower than expected. This could mean that the MDI measures more state qualities of MD than trait qualities.

The results of the MDI subscales, for the most part, also revealed high levels of test-retest reliability. The Body Anxiety subscale revealed a high level of test-retest reliability, $r = .78$, ($p < 0.01$).The Compulsivity subscale also revealed a high level of test-retest reliability, $r = .73$, ($p < 0.01$). The Illusory Correlation subscale also revealed a high level of test-retest reliability, $r = .59$, ($p < 0.01$). The Inadequacy subscale revealed a high level of test-retest reliability, $r = .82$, ($p < 0.01$). The Inappropriate Eating subscale also revealed a high level of test-retest reliability, $r = .78$, ($p < 0.01$). The Increased Muscularity subscale also revealed a high level of test-retest reliability, $r = .75$, ($p < 0.01$). The Muscularity Drive subscale revealed a high level of test-retest reliability, $r = .49$, ($p < 0.01$). The Persistence subscale also revealed a high level of test-retest reliability, $r = .86$, ($p < 0.01$). The Preoccupation subscale revealed a high level of test-

retest reliability, $r = .62$, ($p < 0.01$). All subtests revealed a significant level of test-retest reliability, suggesting that all subtest in the MDI will get consistent responses every time that it is taken by the same individual. Despite the significant results by all subtest, some subtest produced higher scores than other subtest. This suggests that the subtests with the lower scores would measure more state symptoms of MDI than trait symptoms of MDI.

Concurrent Validity

The results of the study demonstrate a good concurrent validity. When the MDI was compared to the MBAS, the results suggest that high scores on the MDI correlate with low scores on the MBAS. Low scores on the MBAS indicate high levels of MD symptoms. This suggests that the MDI accurately measures symptoms such as drive for muscularity, body esteem, pressures for muscularity, internalization of the muscular ideal, pressures for thinness, self-esteem, eating disorder symptomatology, impression management, and body comparison. However, the results of this study did not produce a significant finding when the MDI was compared to the BAS, suggesting that the MDI may not accurately assesses the level of satisfaction that individuals have with different parts of their bodies.

Predictive Validity

The MDI at Time 2 produced significant results when it was compared to the number of hours spent weightlifting. This suggests that the MDI can predict exercise behaviors pertaining to weightlifting and exercising behavior in general.

However, the MDI at Time 1 did not produce significant findings. The total number of hours spent exercising was also compared to the MDI. The MDI at Time 2 produced significant findings, suggesting that the MDI can predict behaviors pertaining

to the high amount of exercise that individuals with MD participate in during the course of a week. However, the MDI at Time 1 did not produce significant findings when compared to the total number of hours spent exercising.

Many significant findings occurred Specific questions in the BQ were also compared to the MDI. Question 9 of the BQ was correlated with the MDI. Question 9 asks about the number of supplements that an individual uses. The MDI at Time 2 was significantly correlated with question 9, suggesting that high scores on the MDI are correlated with supplement use such as steroids or protein shakes. However, the MDI at Time 1 did not produce a significant correlation. Question 17 correlated with the MDI at Time 1. Question 17 asks how many organized sports the individual ever played. This suggests that organized sports are correlated with MD symptoms. However, the MDI at Time 2 did not correlate with Question 17 of the BQ. In Question 18, which asked about the organized sports that the individual currently played, there were no significant findings. This suggests that the MDI is not correlated with current participation is organized sports, which suggests that individuals that suffer from MD are more likely to exercise individually in a place like a gym than to participate in group sports. The findings from the comparison of the MDI with the BQ suggest that the MDI has some ability to predict behaviors that lead to muscle dysmorphia, like supplement usage and exercise practices.

Significant results were found when question 1, "Do you have an active gym membership," was correlated with the MDI at Time 1 and Time 2. High scores on the MDI correlated with an individual possessing an active gym membership. This suggests that individuals with MD are more likely to have an active gym membership. When the

MDI was compared with the number of hours spent in cardiovascular exercise, no significant findings occurred at either Time 1 or Time 2. This is expected because individuals suffering from MD would be more concerned with weightlifting activities instead of cardiovascular exercise.

The MDI appears to measure states rather than traits. This may be why there were not high levels of predictive validity, because states often change and traits remain more stable over time.

Limitations

There were a few limitations to this study. The first limitation was the population selected for the present study, which consists of male college students. The results may not be generalizable to the entire population due to the restricted age range of the sample. However, these are the people for whom body image is the most salient, so it is generalizable to the population of interest. The second limitation is that the results were from a small area in the southeastern part of the United States. The results may not be generalizable to other areas of the United States or the world. A third limitation to the study is that the study was strictly self-report measures. The fourth limitation is that the population used for the study was a non-clinical sample.

Conclusion

The MDI appears to be a good diagnostic tool for clinicians to use when looking at MD. This study examined the reliability and the validity of the MDI. This study shows that the MDI has adequate test-retest reliability. The MDI also has good internal consistency. The results from this study indicate that the MDI has good concurrent validity when compared to other tests that measure symptoms of MD. Under predictive

validity, there was some support to suggest that the MDI can predict MD, however, the predictive validity of the MDI needs to be examined more in-depth. Future research should involve the use of a clinical sample of participants to see if the MDI can discriminate between participants that have been diagnosed with MD. The MDI also appears to measure more state symptoms of MD than trait symptoms, making the MDI better suited as a diagnostic tool for the state symptoms of MD. This may make it easier for clinicians to detect an emerging problem before it becomes harder for the individual to overcome.

References

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed., text rev.). Washington, DC: Author.

Baird, A. L., & Grieve, F. G. (2006). Exposure to male models in advertisements leads to a decrease in men's body image. *North American Journal of Psychology, 8,* 115-122.

Brownell, K. D., & Rodin J. (1994). The dieting maelstrom: Is it possible and advisable to lose weight? *American Psychologist, 49,* 781-791.

Cafri, G. & Thompson, J. K. (2004a). Evaluating the convergence of muscle appearance attitude measures. *Assessment, 11,* 224-229.

Cafri, G. & Thompson, J. K. (2004b). Measuring male body image: A review of the current methodology. *Psychology of Men & Masculinity, 5,* 18-29.

Chandler, C. G. (2007). *An evaluation of the role of anxiety and obsessive-compulsive features in muscle dysmorphia symptomotology*. Unpublished master's thesis, Western Kentucky University, Bowling Green, KY.

Cohane, G. H. & Pope, Jr. H. G. (2001). Body image in boys: A review of the literature. *The International Journal of Eating Disorders,* 29.

Connor-Greene, P. A. (1988). Gender differences in body weight perception and weight-loss strategies of college students. *Women & Health, 14,* 27-41.

Furnham, A., & Calnan, A. (1998). Eating disturbance, self-esteem, reasons for exercising and body weight dissatisfaction in adolescent males. *European Eating Disorders Review, 6,* 58-72.

Grieve, F. G. (2007). A conceptual model of factors contributing to the development of muscle dysmorphia. *Eating Disorders, 15,* 63-80.

Grieve, F. G., Hemlick, A. (2008). The influence of men's self-objectification on the drive for muscularity: Self-esteem, body satisfaction and muscle dysmorphia. *International Journal of Men's Health,* 7, 288-298.

Grieve, F. G., Newton, C. C., Kelley, L., Miller, R. C., Jr., & Kerr, N. A. (2005). The preferred male body shapes of college men and women. *Individual Differences Research, 3,* 188-192.

Harmatz, M. G., Gronendyke, J., & Thomas, T. (1985). The underweight male: The unrecognized problem group of body image research. *The Journal of Obesity and Weight Regulation, 4,* 258-267.

Jonda, J. (2007). *Similarities between etiological models of eating disorder symptomatology and muscle dysmorphia symptomatolgy.* Unpublished Master's thesis, Western Kentucky University, Bowling Green, KY.

Lantz, C. D., Rhea, D. J., & Mayhew, L. J. (2001). The drive for size: A psycho-behavioral model of muscle dysmorphia. *International Sports Journal, 5,* 71-86.

Leit, R. A., Pope, H. G. Jr., & Gray, J. J. (2001). Cultural expectations of muscularity in men: The evolution of Playgirl centerfolds. *International Journal of Eating Disorders, 29,* 90-93.

Lorenzen, L. A., Grieve, F. G., & Thomas, A. (2004). Exposure to muscular male models decreases men's body satisfaction. *Sex Roles, 51*, 743-748.

Maida, D. M., & Armstrong, S. L. (2005). The classification of muscle dysmorphia. *International Journal of Men's Health, 4,* 73-91.

Mayville, S. B., Williamson, D. A., White, M. A., Netemeyer, R. G., & Drab, D. L. (2002). Development of the muscle appearance satisfaction scale. A self-report measure for the assessment of muscle dysmorphia symptoms. *Assessment, 9*, 351-360.

McCreary, D. R., & Sasse, D. K. (2000). An exploration of the drive for muscularity in adolescent boys and girls. *Journal of American College Health, 48,* 297-303.

Olivardia, R. (2001). Mirror, mirror on the wall, who's the largest of them all? The features and phenomenology of muscle dysmorphia. *Harvard Review of Psychiatry, 9,* 254-259.

Pope, H. G., Jr., Gruber, A. J., Choi, P., Olivardia, R., & Phillips, K. A. (1997). Muscle dysmorphia: An underrecognized form of body dysmorphic disorder. *Psychosomatics, 38*, 548-557.

Pope, H. G., Jr., Gruber, A. J., Mangweth, B., Bureau, B., deCol, C., Jouvent, R., & Hudson, J. I. (2001). Body image perception among men in three countries. *American Journal of Psychiatry, 157,* 1297-1301.

Pope, H. G., Jr., & Katz, D. L. (1994). Psychiatric and medical effects of anabolic-androgenic steroids. A controlled study of 160 athletes. *Archives of General Psychiatry, 51,* 375-382.

Pope, H. G., Jr., Katz, D. L., & Hudson, J. I. (1993). Anorexia nervosa and "reverse anorexia" among 108 male bodybuilders. *Comprehensive Psychiatry, 34,* 406-409.

Pope, H. G., Jr., Olivardia, R., Borowiecki, J. J., III, & Cohane, G. H. (2001). The growing commercial value of the male body: A longitudinal survey of advertising in women's magazines. *Psychotherapy and Psychosomatics, 70,* 189-192.

Pope, H. G., Jr., Olivardia, R., Gruber, A., & Boroweicki, J. (1999). Evolving ideals of male body image as seen through action toys. *International Journal of Eating Disorders, 26,* 65-72.

Raudenbush, B., & Meyer, B. (2003). Muscular dissatisfaction and supplement use among male intercollegiate athletes. *Journal of Sports & Exercise Psychology, 25,* 161-170.

Short, J. (2006). *Creating an assessment tool for muscle dysmorphia.* Unpublished master's thesis, Western Kentucky University, Bowling Green, KY.

Tylka, T. L., Bergeron, D., & Schwartz, J. P. (2005). Development and psychometric evaluation of the male body attitudes scale (MBAS). *Body Image, 2,* 161-175.

Vartanian, L. R., Giant, C. L., & Passino, R. M. (2001). "Ally McBeal vs. Arnold Schwarzenegger": Comparing mass media, interpersonal feedback, and gender as predictors of satisfaction with body thinness and muscularity. *Social Behavior and Personality, 29,* 711-724.

Appendix A

Demographics Survey

Demographics Survey

Please answer the following questions in an honest manner. DO NOT include your name or any other identifying information.

Age:_____

Ethnicity: _____

Gender: _____

E-mail address: _____

Appendix B

Muscle Dysmorphia Inventory

MUSCLE DYSMORPHIA INVENTORY

<u>INSTRUCTIONS:</u> Please respond to each of the following statements. Circle response choice that best describes you.

STRONGLY DISAGREE	*SOMEWHAT* DISAGREE	*SLIGHTLY* DISAGREE	*SLIGHTLY* AGREE	*SOMEWHAT* AGREE	*STRONGLY* AGREE
1	2	3	4	5	6

1. When I see my reflection in the mirror or a window, I feel badly about my body size or shape.
   1 2 3 4 5 6
2. Working out causes problems in my job.
   1 2 3 4 5 6
3. I eat specific foods at specific times throughout the day in order to gain muscle mass.
   1 2 3 4 5 6
4. When I see muscular men, it makes me feel badly about my body shape or size.
   1 2 3 4 5 6
5. I am inclined to continue to work out when I am sick.
   1 2 3 4 5 6
6. I am ashamed of my body shape or size.
   1 2 3 4 5 6
7. I have difficulty maintaining relationships because of thoughts about my body.
   1 2 3 4 5 6
8. I am inclined to continue to work out when I am injured.
   1 2 3 4 5 6
9. I have difficulty maintaining relationships because of thoughts of working out.
   1 2 3 4 5 6
10. I believe bad things happen in my life when I do not have a specific level of muscularity.
    1 2 3 4 5 6
11. Working out causes problems in my romantic relationships.
    1 2 3 4 5 6

*12. I believe I am more muscular than others.
    1 2 3 4 5 6

13. I feel badly when I do not get to work out.
    1 2 3 4 5 6
14. I eat by myself.
    1 2 3 4 5 6
15. I am inclined to continue to work out against doctor's orders.
    1 2 3 4 5 6
16. I am inclined to participate in activities that require wearing swimsuits.
    1 2 3 4 5 6

17. I do not believe I am as muscular as others.
    1 2 3 4 5 6

STRONGLY **DISAGREE** **1**	***SOMEWHAT*** **DISAGREE** **2**	***SLIGHTLY*** **DISAGREE** **3**	***SLIGHTLY*** **AGREE** **4**	***SOMEWHAT*** **AGREE** **5**	***STRONGLY*** **AGREE** **6**

18. I want to be more muscular than I currently am.
    1 2 3 4 5 6
19. I think I look better when I have large muscles.
    1 2 3 4 5 6
20. Working out causes problems in my friendships.
    1 2 3 4 5 6
*21. I am muscular enough.
    1 2 3 4 5 6
22. If I could increase my muscle mass, I would.
    1 2 3 4 5 6
23. I have difficulty focusing on schoolwork because of thoughts about my body.
    1 2 3 4 5 6
24. I am not muscular enough.
    1 2 3 4 5 6
25. Others feel that I am way too focused on my body shape or size.
    1 2 3 4 5 6
26. I have difficulty focusing on schoolwork because of thoughts of working out.
    1 2 3 4 5 6
27. I feel insecure about my body.
    1 2 3 4 5 6
28. I use legal or illegal supplements (creatine or anabolic steroids) to help develop my muscles.
    1 2 3 4 5 6
29. I am inclined to participate in activities that require minimal clothing.
    1 2 3 4 5 6
30. The less clothing I wear the more anxious I become.
    1 2 3 4 5 6
31. I eat a large amount of protein in order to increase my muscularity.
    1 2 3 4 5 6
32. I feel anxious when I deviate from my diet.
    1 2 3 4 5 6
33. I believe bad things happen to me when I do not keep my workout schedule.
    1 2 3 4 5 6
34. I feel anxious when I miss a workout.
    1 2 3 4 5 6

Appendix C

Body Assessment Scale

Body Assessment Scale

The following are some areas in which people tend to be concerned about their bodies. Please circle the number that corresponds to how positive or negative you feel about each of the areas.

1. **Weight**	1 strongly negative	2	3 neutral	4	5 strongly positive	14. **Chest**	1 strongly negative	2	3 neutral	4	5 strongly positive
2. **Face (appearance)**	1 strongly negative	2	3 neutral	4	5 strongly positive	15. **Chin**	1 strongly negative	2	3 neutral	4	5 strongly positive
3. **Body Shape**	1 strongly negative	2	3 neutral	4	5 strongly positive	16. **Energy Level**	1 strongly negative	2	3 neutral	4	5 strongly positive
4. **Thighs**	1 strongly negative	2	3 neutral	4	5 strongly positive	17. **Body Build**	1 strongly negative	2	3 neutral	4	5 strongly positive
5. **Upper Body Strength**	1 strongly negative	2	3 neutral	4	5 strongly positive	18. **Physical Coordination**	1 strongly negative	2	3 neutral	4	5 strongly positive
6. **Waist**	1 strongly negative	2	3 neutral	4	5 strongly positive	19. **Buttocks**	1 strongly negative	2	3 neutral	4	5 strongly positive
7. **Reflexes**	1 strongly negative	2	3 neutral	4	5 strongly positive	20. **Calves**	1 strongly negative	2	3 neutral	4	5 strongly positive
8. **Health**	1 strongly negative	2	3 neutral	4	5 strongly positive	21. **Stomach**	1 strongly negative	2	3 neutral	4	5 strongly positive
9. **Shoulders**	1 strongly negative	2	3 neutral	4	5 strongly positive	22. **Physical Condition**	1 strongly negative	2	3 neutral	4	5 strongly positive
10. **Physical Stamina**	1 strongly negative	2	3 neutral	4	5 strongly positive	23. **Triceps**	1 strongly negative	2	3 neutral	4	5 strongly positive
11. **Agility**	1 strongly negative	2	3 neutral	4	5 strongly positive	24. **Abdominal Muscles**	1 strongly negative	2	3 neutral	4	5 strongly positive
12. **Biceps**	1 strongly negative	2	3 neutral	4	5 strongly positive	25. **Legs**	1 strongly negative	2	3 neutral	4	5 strongly positive
13. **Lower Body Strength**	1 strongly negative	2	3 neutral	4	5 strongly positive						

Appendix D

Muscle Appearance Satisfaction Scale

Read each statement carefully, then circle the number that corresponds most closely to your feelings

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. When I look at my muscles in the mirror, I often feel satisfied with my current muscle size	1	2	3	4	5
2. If my schedule forces me to miss a day of working out with weights, I feel very upset	1	2	3	4	5
3. I often ask friends and/or relatives if I look big	1	2	3	4	5
4. I am satisfied with the size of my muscles	1	2	3	4	5
5. I often spend money on muscle-building supplements	1	2	3	4	5
6. It is OK to use steroids to add muscle mass	1	2	3	4	5
7. I often feel like I am addicted to working out with weights	1	2	3	4	5
8. If I have a bad workout, it is likely to have a negative effect the rest of my day	1	2	3	4	5
9. I would try anything to get my muscles to grow	1	2	3	4	5
10. I often keep working out even when my muscles or joints are sore from previous workouts	1	2	3	4	5
11. I often spend a lot of time looking at my muscles in the mirror	1	2	3	4	5
12. I spend more time in the gym working out than most others who work out	1	2	3	4	5
13. To get big, one must be able to ignore a lot of pain	1	2	3	4	5
14. I am satisfied with my muscle tone/definition	1	2	3	4	5
15. My self-worth is very focused on how my muscles look	1	2	3	4	5
16. I often ignore a lot of physical pain while I am lifting to get bigger	1	2	3	4	5
17. I must get bigger muscles by any means necessary	1	2	3	4	5
18. I often seek reassurance from others that my muscles are big enough	1	2	3	4	5
19. I often find it difficult to resist checking the size of my muscles	1	2	3	4	5

Appendix E

Male Body Attitudes Scale

MBAS

Please indicate whether each question is true about you always, usually, often, sometimes, or never.

1. I think I have too little muscle on my body.

1	2	3	4	5	6
Always	Usually	Often	Sometimes	Rarely	Never

2. I think that my body should be leaner.

1	2	3	4	5	6
Always	Usually	Often	Sometimes	Rarely	Never

3. I wish that my arms were stronger.

1	2	3	4	5	6
Always	Usually	Often	Sometimes	Rarely	Never

4. I feel satisfied with the definition in my abs (i.e., stomach muscles).

1	2	3	4	5	6
Always	Usually	Often	Sometimes	Rarely	Never

5. I think that my legs are <u>not</u> muscular enough.

1	2	3	4	5	6
Always	Usually	Often	Sometimes	Rarely	Never

6. I think my chest should be broader.

1	2	3	4	5	6
Always	Usually	Often	Sometimes	Rarely	Never

7. I think my shoulders are too narrow.

1	2	3	4	5	6
Always	Usually	Often	Sometimes	Rarely	Never

8. I am concerned that my stomach is too flabby.

1	2	3	4	5	6
Always	Usually	Often	Sometimes	Rarely	Never

9. I think that my arms should be larger (i.e., more muscular).

1	2	3	4	5	6
Always	Usually	Often	Sometimes	Rarely	Never

10. I feel dissatisfied with my overall body build.

1	2	3	4	5	6
Always	Usually	Often	Sometimes	Rarely	Never

11. I think that my calves should be larger (i.e., more muscular).

1	2	3	4	5	6
Always	Usually	Often	Sometimes	Rarely	Never

12. I wish I were taller.

1	2	3	4	5	6
Always	Usually	Often	Sometimes	Rarely	Never

13. I think that I have too much fat on my body.

1	2	3	4	5	6
Always	Usually	Often	Sometimes	Rarely	Never

14. I think that my abs are <u>not</u> thin enough.

1	2	3	4	5	6
Always	Usually	Often	Sometimes	Rarely	Never

15. I think my back should be larger and more defined.

1	2	3	4	5	6
Always	Usually	Often	Sometimes	Rarely	Never

16. I think my chest should be larger and more defined.

1	2	3	4	5	6
Always	Usually	Often	Sometimes	Rarely	Never

17. I feel satisfied with the definition in my arms.

1	2	3	4	5	6
Always	Usually	Often	Sometimes	Rarely	Never

18. I feel satisfied with the size and shape of my body.

1	2	3	4	5	6
Always	Usually	Often	Sometimes	Rarely	Never

19. I am satisfied with my height.

1	2	3	4	5	6
Always	Usually	Often	Sometimes	Rarely	Never

20. Has eating sweets, cakes, or other high calorie food made you feel fat or weak?

1	2	3	4	5	6
Always	Usually	Often	Sometimes	Rarely	Never

21. Have you felt excessively large and rounded (i.e., fat)?

1	2	3	4	5	6
Always	Usually	Often	Sometimes	Rarely	Never

22. Have you felt ashamed of your body size or shape?

1	2	3	4	5	6

Always	Usually	Often	Sometimes	Rarely	Never

23. Has seeing your reflection (e.g., in a mirror or window) made you feel bad about your size or shape?

1	2	3	4	5	6
Always	Usually	Often	Sometimes	Rarely	Never

24. Have you been so worried about your body size or shape that you have been feeling that you ought to diet?

1	2	3	4	5	6
Always	Usually	Often	Sometimes	Rarely	Never

Appendix F

Body Questionnaire

Body Questionnaire (BQ)

EXERCISE HISTORY

7. DO YOU HAVE AN ACTIVE GYM MEMBERSHIP? YES NO

8. DO YOU LIFT WEIGHTS? YES NO

9. IF YOU LIFT WEIGHTS, HOW MANY DAYS PER WEEK DO YOU ENGAGE IN THESE ACTIVITIES? _____

10. HOW MANY TIMES PER DAY DO YOU LIFT WEIGHTS? _____

11. HOW LONG DOES EACH WEIGHT LIFTING SESSION LAST? _____

12. DO YOU HAVE A SCHEDULED TIME THAT YOU LIFT WEIGHTS?
YES NO

13. IF SO, WHAT TIME/S OF DAY DO YOU TYPICALLY LIFT WEIGHTS?
_____

14. DO YOU USE SUPPLEMENTS? YES NO

15. WHICH OF THE FOLLOWING SUPPLEMENTS DO YOU CURRENTLY USE?

STEROIDS ____

CREATINE ____

VITAMINS ____

PROTEIN SHAKES ____

PLEASE LIST ANY OTHER SUPPLEMENTS THAT YOU USE:

16. DO YOU PARTICIPATE IN CARDIOVASCULAR EXERCISE (e.g. TREADMILL, SWIMMING, ELLIPTICAL TRAINER, BIKE, AEROBICS, ETC.)?
YES NO

17. IF YOU PARTICIPATE IN CARDIOVASCULAR EXERCISE, HOW MANY DAYS PER WEEK DO YOU ENGAGE IN THESE ACTIVITIES? _____

18. HOW MANY TIMES PER DAY DO YOU PARTICIPATE IN CARDIOVASCULAR EXERCISE? _____

19. HOW LONG DOES EACH CARDIOVASCULAR SESSION USUALLY LAST? _____

20. DO YOU HAVE A SCHEDULED TIME THAT YOU PARTICIPATE IN CARDIOVASCULAR EXERCISE? YES NO

21. WHAT TIME/S OF DAY DO YOU PARTICIPATE IN CARDIOVASCULAR EXERCISE? _____

22. LIST ALL FORMS OF EXERCISE THAT YOU DO.

23. LIST ALL THE ORGANIZED SPORTS THAT YOU HAVE EVER PLAYED (e.g. BASEBALL, FOOTBALL, BASKETBALL).

24. LIST ALL THE ORGANIZED SPORTS THAT YOU **CURRENTLY** PLAY.

HEALTH HISTORY

25. DO YOU HAVE TO USE TOPICAL ANALGESICS (e.g. ICY HOT, BENGAY, FLEXALL 454) **BEFORE** YOU ENGAGE IN ANY TYPE OF EXERCISE?
YES NO

26. DO YOU HAVE TO USE TOPICAL ANALGESICS (e.g. ICY HOT, BENGAY, FLEXALL 454, CAPCASIN) **AFTER** YOU FINISH EXERCISING? YES NO

27. DO YOU EVER HAVE TO USE PAIN MEDICATION **BEFORE** YOU EXERCISE (e.g. ANTI-INFLAMMATORIES, OVER-THE-COUNTER OR PRESCRIPTION PAIN MEDICINES)?
YES NO

28. DO YOU EVER HAVE TO USE PAIN MEDICATION **AFTER** YOU EXERCISE (e.g. ANTI-INFLAMMATORIES, OVER-THE-COUNTER OR PRESCRIPTION PAIN MEDICINES)?
YES NO

29. DO YOU HAVE ANY MEDICAL CONDITIONS THAT WOULD LIMIT OR INHIBIT EXERCISE? YES NO

30. IF SO, PLEASE LIST THE CONDITIONS.

31. ARE YOU PRESENTLY ON ANY MEDICATIONS (OVER THE COUNTER OR PRESCRIPTION)? YES NO

32. IF SO, PLEASE LIST THESE MEDICATIONS.